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Letter of advice from a scientist re: climate change policies

Mark P. Silverman

TO: President Joseph Biden
FROM: Dr Mark P Silverman
SUBJECT: Letter of advice from a scientist re: climate change policies
DATE: 3 February 2021

Dear Mr. President

As an American atomic and nuclear physicist I was greatly heartened by your declaration to be guided by science in the implementation of public policy. In a real science like physics, facts matter. Accuracy matters. Integrity matters. Truth matters. It would be a welcomed change to see these ideals of science embraced as well by the nation's policy makers.

I cannot emphasize too strongly, however, that not everything that is considered a science is one. A *real* science is a tightly constrained structure. It requires a self-consistent base of concepts and laws amenable to reproducible empirical verification by well-understood and reliable methods and instruments. Without a solid base of such physical principles and measurements to reason from, any debate over public policy reduces to little more than expressions of personal opinion and political ideology.

In the course of your administration you may find that very real scientific facts run counter to what you consider self-evident truths. I will give you a critically important example that underlies nearly every major decision you are likely to make in the next four years. Let us start by considering climate change.

It is by now commonplace knowledge, to all but unswayable deniers, that the intensifying markers of climate change (global temperature, local heat waves, frequency of violent storms, biological extinctions, etc.) are due to human activity. But *which* human activity? The usual attribution is the release of greenhouse gases by combustion of fossil fuels. The usual remedy is to reduce the use of fossil fuels by policies promoting "green energy" such as solar, hydro, wind, geothermal, and possibly nuclear. While correct as far as it goes, this well-publicised cause and solution neglects entirely the single most consequential human activity that accelerates the rate of climate change: human reproduction.

In 1900 there were approximately 1,500 million people on Earth. Had that number remained stable, the impact of human generation of greenhouse gases on climate change would have been marginal at most. In 2021, however, there are approximately 8,000 million people on Earth. And the number is increasing *exponentially* at a rate such that, barring catastrophic population loss, the doubling time of the human population is about 66 years. In other words, if nothing intervenes, you can expect at least 16,000 million people on the planet before the end of the current century. The path to this unsustainable number must either be reversed humanely by the collective action of world leaders, or Nature itself will reduce humanity by famine, drought, disease, and war, as has occurred at various times in the past—and, in fact, is currently occurring.

Let me explain what *exponential* actually means; it is *not* simply a hyperbolic synonym for "large" or "great". Whatever grows exponentially increases in proportion to how much of it there is at the moment. Suppose for illustration that the current population of about 8,000 million humans is increasing exponentially by 1% each year (which, in fact,

understates the problem). In that case the number of people on Earth next year will be greater by 80 million, bringing the global human population to 8,080 million. The following year the number of people will increase by 1% of 8,080 million, or by nearly 81 million, bringing the human population to nearly 8,161 million people. And the year following that the population will be greater still by 81.6 million, leaving 8,242 million people to vie for limited resources on a finite planet. Every year, until natural forces restrain or collapse this growth, the size of the human population on the planet will grow by an *increasingly larger* number than the year before.

As a physicist who has spent close to a half century studying energy, the environment, and the impact of humans on the environment, I understand and sympathise with the goal of mitigating climate change by reducing greenhouse gases. But for a moment let us return to those 80 million additional people who arose from the first iteration of exponential growth in the illustration above. They will need energy for food, shelter, warmth, waste removal, travel, work, and recreation, among other things. Land will be cleared to make room for their homes. Land will be cleared to accommodate their gardens or pastures. More aquifers will be tapped to find water for them to drink, to bathe in, to cook with. Additional forests will be cleared to find building materials for them. More extensive mining will take place to find more needed coal and minerals, and more extensive drilling will be called for to find more petroleum and natural gas. Every activity to allow the additional 80 million people to grow, raise animals, bring up children, purchase necessities, work for a living and prepare for the future—in short, to live—will release greenhouse gases as well as toxic gases that are by-products of a scaled-up industrial production required by the larger global population.

And that was just the first iteration. In the second iteration there are now 80.8 million more people whose needs are the same and have to be met. And in the third iteration there will be 81.6 million more. The widely hailed solar energy panacea lies well in the future. And even if it were imminent, which it is not, the land surface of Earth is finite and cannot supply an ever increasing need of space and natural materials to accommodate an exponentially growing number of people. Likewise, the finite ocean can absorb only so much human industrial and personal waste before it ceases to sustain life.

Mr President, there is *no* practicable way to reduce greenhouse gases and other noxious chemicals faster than an exponentially growing human population can generate them. Indeed, the strategy most likely to succeed in sequestering carbon dioxide is to maintain and expand coastal wetlands and to protect forested land and to restore deforested land by planting trees. But this can be achieved only when the human population is stabilised to a sustainable number rather than expanding into and destroying the very regions of the Earth that help the most to mitigate climate change.

The unrestricted growth of the human population exacerbates not just climate change, but every major problem the US faces, including depletion of non-renewable natural resources (oil, natural gas, coal, iron, aluminium, uranium-235, rare-earth minerals and others), loss of arable land and clean aquifers by residential and industrial development, degradation of the natural environment by pollution, the spread of global disease, and the undermining of our national security. These last two items may not be apparent to you, so let me be specific.

The current pandemic arose in a densely populated part of Asia where people expanded their living space into surrounding natural areas, thereby coming into contact with wildlife whose viruses before then had little or no opportunity to infect human hosts. The spread of Ebola in West Africa a few years ago arose in the same way. And the next global epidemic may very well arise in overcrowded parts of South America as people in search of food, work, and wealth expand into and further destroy the Amazonian rainforest.

Besides the global spread of disease, the inevitable result of overpopulation is the spread of people. The flood of migrants from Africa into Europe and from the lower Americas into the US are but a sample of the even vaster migrations to come as numbers of people in overpopulated regions of the planet soar past the limits of their own lands to sustain them. The matter of immigration is a delicate subject—all the more so in view of the previous administration. The US began and grew with the influx of diverse populations that broadened the American cultural landscape and contributed over time to a democracy in closer accord to the spirit of its founding documents. But, as the entire human population approaches (and may have already exceeded) the Earth's capacity to sustain it, there are physical limits to what any one country can absorb. If real science is indeed to be your guiding star, then the matter of population growth and immigration cannot be postponed any longer. Without a well-defined national policy that addresses who can come, and how many, and balances fairness with national need, an ensuing immigration crisis will destabilise the US as it has in recent years the UK and the EU and make your goal of national unity unachievable.

Several prominent economists in recent years have advocated major growth in the US population with at least one calling for 1,000 million—i.e. roughly the current population of India. Be *very* wary of advice from economists. Economics is *not* a science. What passes for principles of traditional economics does not meet the standards of science as I outlined in the beginning. All economic advice is an expression of someone's personal philosophy, ideology, or opinion, and is often at variance with the facts and principles of real science.

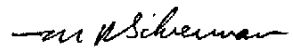
Be aware that traditional economics fails to achieve the very purpose of its existence, which at root is to provide a reliable means of monetising goods and services. It fails in this regard because it relegates to an "externality" the most important component of national and global wealth, namely the goods and services rendered "free" by the natural environment. To traditional economists, no one owns the environment, and so no one is responsible for the value lost in degrading it. To traditional economics, the environment is a vast global cloaca into which providers and consumers can pour their wastes at no expense. The consequence of this false tenet is that everyone pays, especially the most vulnerable, by the diminished health, welfare, and security of the nation. The call by economists for the US to increase its population by the millions is egregiously wrong and harmful. It is a further example of relegating to a fictitious externality the environmental destruction and loss of quality of life engendered by overpopulation.

Mr President, here in a nutshell is what I have to tell you: Nothing you do to mitigate climate change will have a lasting or significant effect if you do not also work toward achieving a stable, sustainable human population here in the US and abroad. These words are not my opinion, philosophy, or ideology. They do not mask any latent racism, ethnocentrism, or xenophobia. They merely state a fundamental scientific truth to which

real science, if you intend to follow it, inexorably leads. If in the course of your administration you have time to read only one book, I urge you to read *Overdevelopment, Overpopulation, Overshoot*—and keep in mind its stunning, yet disturbing, photography of the human imprint on this precious blue planet.

My best wishes to you in your most difficult undertaking.

Sincerely



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Dr Silverman is the G A Jarvis Professor of Physics at Trinity College. He received his PhD in chemical physics/atomic physics from Harvard University. His pioneering studies[1] of solar energy diffusion and climate change predicted that urban heat-related mortality would be among the most lethal consequences of climate change to be experienced soonest. He is the author of over 200 scientific papers and 7 books (Publishers: Princeton, Cambridge, Springer). His seventh and most recent book is *A Certain Uncertainty: Nature's Random Ways* (Cambridge). For more information see mpsilverman.com and amazon.com/Mark-P.-Silverman/e/B001HMOC5O.

[1]M P Silverman, "Statistical Analysis of Subsurface Diffusion of Solar Energy with Implications for Urban Heat Stress", *Journal of Modern Physics* **5** (2014) 751-762